#17 Transition from Research to Operations by the NCEP/EMC Land Team

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One of the main NCEP/EMC missions is to transition operational forecast models from research to operation. EMC operates numerical forecast systems for a wide range of scale from short-time (NAM), medium-range(GFS) to seasonal and climate (CFS). In collaboration with its partners, the NCEP/EMC land team has been actively transitioning the land surface upgrades including physics and the new dataset from research community to the NCEP/EMC operational models:

(1) Working with the colleagues from University of Arizona and JCSDA, the reformulation of surface roughness length for heat was implemented in the operational GFS to reduce daytime LST cold bias over desert and arid regions in the warm season, which results in larger amounts of satellite data accepted in the data assimilation over land in the GSI/CRTM. The microwave land surface emissivity calculation was improved and implemented in the new released CRTM 2.1 version. The new high-resolution MODIS-based LSC data was used in the operational NAM.

(2) Working with international colleagues on fresh lake modeling, lake surface temperature climatology for the North America has been created, and is in validation stage, and will be implemented in NAN operation forecast.

(3) Under the support from the current CPO/MAPP program on the transition of latest development on Noah LSM into operation, the Noah LSM with Multiple-Parameterization (MP) options is being tested in the CFS. The CFS/Noah MP provides a prototype for the next generation of physics-based ensemble approach for seasonal prediction. The implementation has been in close collaborations with the Noah MP development team members from U. Texas at Austin, U. Arizona at Tucson, and NCAR.

(4) Working with NASA and the other external collaborators,   three Land Data Assimilation Systems (LDAS) have been developed to support a wide range of climate, weather, and hydrometeorology applications:
    a) The purpose of NLDAS is to provide initial land states to regional numerical models to enhance regional weather and climate prediction skills, and to support CPC monthly drought briefing and the U.S. National Integrated Drought Information System (NIDIS). The operational implementation of NLDAS monitoring/analysis component will take place next year.
    b) The purpose of GLDAS is to provide enhanced initial land states to the NCEP CFS to improve global seasonal climate simulation and prediction, and to the NCEP GFS to improve global medium range weather prediction, and generate hydrometeorological reanalysis products to support users.
    c) HRAP-NLDAS for long-term and near real-time high-resolution (~4 km) hydrometeorological products to support hydrological research and application at NWS River Forecast Centers and OHD, as well as furthering their support of HTB.

(5) Working with the colleagues from NESDIS and NASA, the testing of assimilating the NESDIS operational satellite land products such as skin temperature, snow, and soil moisture has begun. The LIS DA tool will be used to ingest these satellite land products to upgrade the land surface initial conditions in GFS and NAM.

The NCEP/EMC land team is also involves in transition-from-operations to research. We actively participate some international model inter-comparison   projects such as PALS(Land Model Benchmarking) and DICE(Diurnal land/atmosphere coupling experiment) to improve NCEP weather and climate model components.